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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,535	12/11/2003	Ron Porat	E020007USU1	9706

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ENTROPIC COMMUNICATIONS, INC.
6290 SEQUENCE DRIVE
SAN DIEGO, CA 92121

EXAMINER	
ELPENORD, CANDAL	

ART UNIT	PAPER NUMBER
2416	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/734,535	PORAT ET AL.	
	Examiner	Art Unit	
	CANDAL ELPENORD	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,9 and 11-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,9 and 11-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *December 11, 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 01, 2009 has been entered.

2. Claims 1-2, 6 and 9 have been amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claims 1-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al (US 7,095,709 B2).

Regarding claim 1, Walton '709 discloses a method comprising assigning (see, transmission of identical symbols on multiple sub bands to achieve frequency diversity, col. 10, line 55-67) within a modulator of a transmitter (fig. 3, control modulation element 316 and the diversity processor 320 of the transmitter that provides on OFDM stream to OFDM modulator, col. 8, line 65-67), redundant symbols (fig. 3, information bits) each such redundant symbol representing the same data bits of a message in the same way and modulating the redundant symbols onto a plurality of carriers (see, transmission of identical symbols on multiple sub bands to achieve frequency diversity, col. 10, line 55-67) to create a non-uniform repetition pattern that distributes the data bits across carriers in a pseudorandom pattern (see OFDM bits distributed randomly across sub bands to exploit frequency diversity, col. 7, line 42-49) that insures non-periodicity in the location of carriers modulated by the same data bit carrier assignment wherein frequency intervals between carriers assigned to a data bit are different for each interval (see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13) and wherein the method creates

frequency diversity in a multicarrier OFDM signal to overcome impairment caused by periodic nulls in a multipath channel (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34).

In view of the above, it would have obvious to one skilled in the art to create frequency diversity by transmitting the same OFDM symbol or data to multiple carriers in order to combat multipath interference. Additionally, that feature is well-known fact in OFDM as understood by those skilled in the art.

6. **Claims 2-4, 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Badri et al (US 7,173, 979 B1) in view of Walton et al (US 7,095,709 B2).

Regarding claim 2, Badri '979 discloses a method of allocating data bits to multiple carriers for transmission (see. "method for transmitting information symbols using a plurality of carriers" "transmission symbols allocated to the information symbol", col. 3, lines 44-53), each carrier representing at least one selecting a data bit from a message (see, "carrier modulated with transmission symbol", col. 3, lines 56-59); selecting a symbol to represent the selected data bit (see, generating of a transmission symbol, from an information symbol which then transmitted using a plurality of carriers, col. 3, lines 63 to col. 4, lines 10); redundantly assigning the symbol within a modulator of a transmitter (see, the combination of modulating the first symbol to a carrier ant then transmitting the modulated symbol for a first time, col. 4, lines 14-20), to a plurality Of carriers (see, mapping diversity where multiple representation of the information symbol on the carriers, col. 19, lines 29-34) comprising the steps of: assigning the

symbol to a first carrier (see, the first transmission symbol which derived from an information symbol is transmitted via a first carrier, col. 10, lines 34-44); and repeating the steps of selecting data bits and selecting a symbol to bits carriers (see, generating of a transmission symbol from an information symbol which then transmitted using a plurality of carriers, col. 3, lines 63 to col. 4, lines 10, see bits of the information symbols, col. 8, lines 56-58, (see, modulating of transmission symbol on first and second carrier at 1st and second time, col. 4, lines 53-65).

Regarding claim 3, Badri '979 discloses the method wherein each carrier spacing for each symbol data is different from every other carrier spacing for the symbol (1st and second time interval", recited in col. 3, lines 43-61, "difference between the transmission symbol", recited in col. 3, lines 62- col. 4, lines 20).

Regarding claim 4, Badri '979 discloses the method ("transmitting information using plural carriers", recited in abstract, lines 1-7) wherein the ratio of carriers to data bits is 16 ("number of bit to signal constellation and 16 possibilities", recited in col. 7, lines 40 - col. 8, lines 30).

Regarding claim 6, Badri '979 discloses a method of transmitting (see. "method for transmitting information symbols using a plurality of carriers" "transmission symbols allocated to the information symbol", col. 3, lines 44-53), the method comprising the steps of: determining a number of data bits represented by one symbol ("extracting information symbol contained in the transmission symbols", recited in abstract, lines 9-

14, see demodulating of the received transmission symbols in order to determine the information symbol, col. 4, lines 33-43); selecting from the message a number of data bits equal to the number of bits represented by the one each symbol (see, bits of the information symbols for transmission of information, col. 8, lines 56-58, "determining the information symbols from the transmission symbols", recited in col. 4, lines 66-col. 5, lines 14).

Badri '979 discloses all the claimed limitations with the exception of claimed features:

Regarding claim 2, assigning the symbol to a second carrier with a first carrier spacing from the first carrier; assigning the symbol to a third carrier with a second carrier spacing from the second carrier that is different from the first carrier spacing; wherein the assignment of symbols to carriers produces a non-uniform repetition pattern that distributes the data bits across carriers in a pseudorandom pattern that insures non-periodicity in the location of carriers modulated by the same data bit.

Regarding claim 6, and assigning in a modulator, a portion of the one symbol, the portion representing at least one data bit, to a first plurality of carriers and redundantly assigning the same portion of the one symbol to at least a second unique plurality of carriers in a repetition pattern that distributes the at least one data bit across carriers in a pseudorandom pattern, wherein the frequency separation of the first plurality of carriers and the second plurality of carriers is non-uniformly distributed to insure non-periodicity in the location of carriers modulated by the one data bit over a set of available frequencies upon which the first and second plurality of carriers are

transmitted.

However, Walton '709 from the same field of endeavor discloses the above claimed features:

Regarding claim 2, assigning the symbol to a second carrier (see , redundant transmission of modulation symbols over multiple OFDM sub bands, col. 2, lines 60-65) with a first carrier spacing from the first carrier (see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13); assigning the symbol to a third carrier (see, redundant transmission of modulation symbols over multiple OFDM sub bands, col. 2, lines 60-65) with a second carrier spacing from the second carrier that is different from the first carrier spacing (see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13); wherein the assignment of symbols to carriers produces a non-uniform repetition pattern that distributes the data bits across carriers in a pseudorandom pattern (see OFDM bits distributed randomly across sub bands to exploit frequency diversity, col. 7, line 42-49) that insures non-periodicity in the location of carriers (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34) modulated by the same data bit (see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13).

Regarding claim 6, and assigning (see, transmission of identical symbols on multiple sub bands to achieve frequency diversity, col. 10, line 55-67) in a modulator (fig. 3, control modulation element 316 and the diversity processor 320 of the transmitter

that provides on OFDM stream to OFDM modulator, col. 8, line 65-67), a portion of the one symbol, the portion representing at least one data bit (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34), to a first plurality of carriers (see , redundant transmission of modulation symbols over multiple OFDM sub bands, col. 2, lines 60-65) and redundantly assigning the same portion of the one symbol to at least a second unique plurality of carriers (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34) in a repetition pattern (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34) that distributes the at least one data bit across carriers in a pseudorandom pattern (see OFDM bits distributed randomly across sub bands to exploit frequency diversity, col. 7, line 42-49) , wherein the frequency separation of the first plurality of carriers and the second plurality of carriers is non-uniformly distributed to insure non-periodicity in the location of carriers modulated by the one data bit over a set of available frequencies upon which the first and second plurality of carriers are transmitted (see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13).

In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Badri '979 by using the teaching features as taught by Walton '709 in order to provide transmission diversity by establishing orthogonally among multiple OFDM signals and redundantly

transmitting the data, col. 2, line 31-36.

7. **Claims 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Badri et al (US 7,173,979 B1) in view Walton et al (US 7,095,709 B2) as applied to claims 2, 6 above, and further view Tager et al (US 6,751,262 B1).

The combination of Badri '979 and Walton '709 discloses all the claimed limitations with the exception of claimed features: regarding claims 11-12, the method, wherein some of the carriers are zeroed out to avoid interference resulting from the transmitted.

However, Tager '262 from the same field of endeavor discloses the above claimed features: the method wherein some of the carriers are zeroed out ("zero crossings where the carrier frequencies can not overlap each other", recited in col. 2, lines 29-67) to avoid interference resulting from the transmitted ("use of zero crossing of carrier frequencies to eliminate interference", recited in col. 2, lines 26-67).

In view of the above, having the combined teaching features of Badri '979, Walton '709 and OFDM data transmission of Tager '262, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Badri '979 with Walton '709 by using features as taught by Tager '262 in order eliminate carrier interference in an OFDM system.

8. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleider et al (US 6,487,252 B1) in view of Walton et al (US 7,095,709 B2).

Regarding claim 9, Kleider '252 discloses an OFDM modulator (fig. 1, Modulator 14, col. 2, lines 37-43) for transmitting a binary data word in a symbol having frequency diversity comprising: a ramp counter for producing a series of bin number values (fig. 1, Pilot Sequence Generator 18 producing a plurality of pilot tone to frequency bins, col. 2, lines 55-62, col. 3, lines 47-54); a look up table (fig. 2, Frequency Bin Assignment Table 110) for mapping the bin number values to bit select values (see, assignment of pilot tone to the frequency bins, col. 4, lines 46-50), the look up table comprising entries that produce an assignment of bits to carriers (fig. Frequency Bin Assignment Table 110 with frequency bin locations, col. 3, lines 47-51, lines 58-63), the assignment resulting in bits being repeated over a selection of carriers that have a non-uniform distribution over a set of available frequencies upon which the carriers are transmitted.

Kleider '252 discloses all the claimed limitation with the exception of being silent with respect to claimed features: the assignment resulting in bits being repeated over a selection of carriers that have a non-uniform pseudorandom pattern for distribution over a set of available frequencies upon which the carriers are transmitted.

However, Walton '709 from the same field of endeavor discloses the above claimed features: the assignment resulting in bits being repeated over a selection of carriers (see, redundant transmission of modulation symbols over multiple OFDM sub bands, col. 2, lines 60-65) that have a non-uniform pseudorandom pattern (see OFDM

bits distributed randomly across sub bands to exploit frequency diversity, col. 7, line 42-49) for distribution over a set of available frequencies upon which the carriers are transmitted (see, repetition of the same OFDM symbol in order to avoid selective multipath fading, col. 9, line 8-14, col. 12, line 29-34,see, repeated symbols are separated from each other by a bandwidth of channel (i.e. distance or frequency separation), col. 11, line 7-13).

. In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Kleider '252 by using the teaching features as taught by Walton '709 in order to provide transmission diversity by establishing orthogonally among multiple OFDM signals and redundantly transmitting the data, col. 2, line 31-36.

9. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleider et al (US 6,487,252 B1) in view of Walton et al (US 7,095,709 B2) as applied to claim 13 above, and further in view of Tager et al (US 6,751,262 B1).

The combination of Kleider '252 and Walton '709 discloses all the claimed limitations with the exception of claimed features: **regarding claim 13**, the OFDM modulator further comprising means for disabling I and Q carrier amplitudes for a particular carrier and zeroing the transmitted energy for the carrier.

However, Tager '262 from the same field of endeavor discloses a method comprising means for disabling the I and Q carrier amplitudes for a particular carrier ("zero crossings where the carrier frequencies can not overlap each other", recited in

col. 2, lines 29-67), and zeroing ("zero crossings where the carrier frequencies can not overlap each other", recited in col. 2, lines 29-67) the transmitted energy for the carrier ("use of zero crossing of carrier frequencies to eliminate interference", recited in col. 2, lines 26-67).

In view of the above, having the orthogonal frequency division multiplexed wideband communication system of Kleider '252, the method and device for transmitting an OFDM symbol using plurality of subbands of Walton '709 and the teaching features of Tager '262, it would have been obvious to one of ordinary skill in the art at the time to modify the features of Kleider '252 with Walton '709 by using features as taught by Tager '262 in order prevent carrier interference in an OFDM system.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Michon et al (US 6,810,006 B2) and Maltsev et al (US 2004/0190637 A1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CANDAL ELPENORD whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 8:00AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Bin Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Candal Elpenord/

Examiner, Art Unit 2416

/KWANG B. YAO/
Supervisory Patent Examiner, Art Unit 2416